

-13-

CLAIMS

1. In a cooling system having a refrigerant evaporator, a heat
exchanger comprising:

a suction line for refrigerant output from said evaporator, said suction line
including first and second substantially parallel straight cylindrical
portions connected in series whereby said second straight
cylindrical portion receives gaseous refrigerant from said first
straight cylindrical portion; and

a capillary tube adapted to carry cooled refrigerant to said evaporator,
said capillary tube including first and second helically wound
portions connected in series whereby said second helically wound
portion receives cooled refrigerant from said first helically wound
portion, said first helically wound portion being wrapped around
said suction line second straight cylindrical portion and said
second helically wound portion being wrapped around said suction
line first straight cylindrical portion.

2. The heat exchanger of claim 1, further comprising a bypass
safety valve between an inlet to said first helically wound portion of said capillary
tube and an outlet from said second helically wound portion of said capillary
tube, said bypass safety valve opening responsive to a selected pressure
differential between said inlet to said first helically wound portion of said capillary
tube and said outlet from said second helically wound portion of said capillary
tube.

-14-

3. The heat exchanger of claim 1, wherein said suction line
2 includes a U-shaped portion connecting said first and second cylindrical portions
of said suction line.

4. The heat exchanger of claim 1, further comprising an
2 accumulator between said first and second cylindrical portions of said suction
line.

5. The heat exchanger of claim 1, wherein said refrigerant
2 comprises CO₂ and said capillary tube is an expansion device for said cooled
CO₂ refrigerant.

6. The heat exchanger of claim 1, wherein said cooling system
2 is transcritical.

7. In a cooling system having a refrigerant evaporator, a heat
2 exchanger comprising:

a suction line for refrigerant output from said evaporator, said suction line

4 including

a straight portion substantially cylindrical about an axis, and

6 an accumulator between said evaporator and said suction line

straight portion, said accumulator including

8 a phase separation chamber having an input for refrigerant

from said evaporator and an outlet for gaseous

10 refrigerant from which oil and liquid droplets have

been separated in said phase separation chamber,

-15-

12 a accumulator including a discharge opening for
 discharging oil to return said oil to said system,
14 a vertical pipe between said phase separation chamber and
 said accumulator; and
16 a capillary tube adapted to carry cooled refrigerant to said evaporator,
 said capillary tube including a portion helically wound around a
18 central axis generally coinciding with said suction line straight
 portion axis.

8. The heat exchanger of claim 7, further comprising a second
2 vertical pipe between said phase separation chamber and said accumulator,
 said second vertical pipe adapted to hold a selected volume of refrigerant
4 charge.

9. The heat exchanger of claim 7, wherein said cooling system
2 is transcritical.

10. The heat exchanger of claim 7, wherein said refrigerant
2 comprises carbon dioxide.